

WHAT IS CLAIMED IS:

1. A microelectronic package comprising:

a microelectronic component having a mounting surface;
a substrate having a facing surface; and
an attachment layer that is interposed between and bonded to said mounting surface of said microelectronic component and said facing surface of said substrate so as to attach said microelectronic component onto said substrate;

wherein:

said attachment layer comprises a layer of an adhesive and plural generally ball-shaped spacer elements dispersed in said adhesive;

said spacer elements respectively have a nominal diameter that corresponds to a stand-off distance between said mounting surface of said microelectronic component and said facing surface of said substrate; and

said spacer elements comprise a plastic material that is at least slightly elastically flexible and resilient.

2. The microelectronic package according to claim 1, wherein said adhesive has a first coefficient of thermal expansion, and said plastic material of said spacer elements has a second coefficient of thermal expansion that at least approximately corresponds to said first coefficient of thermal expansion of said adhesive.

1 3. The microelectronic package according to claim 1, wherein
2 said adhesive has a first coefficient of thermal expansion,
3 and said plastic material of said spacer elements has a
4 second coefficient of thermal expansion that is not less
5 than one tenth of said first coefficient of thermal
6 expansion of said adhesive.

1 4. The microelectronic package according to claim 1, wherein
2 said spacer elements consist essentially of said plastic
3 material, and said plastic material has a coefficient of
4 thermal expansion on the order of 10^{-4} K^{-1} or 10^{-5} K^{-1} .

1 5. The microelectronic package according to claim 4, wherein
2 said coefficient of thermal expansion is in a range from
3 $4 \times 10^{-5} \text{ K}^{-1}$ to $6 \times 10^{-5} \text{ K}^{-1}$.

1 6. The microelectronic package according to claim 5, wherein
2 said plastic material is a mixture or copolymer of at least
3 two different polymers.

1 7. The microelectronic package according to claim 1, wherein
2 said plastic material is elastically flexible and resilient
3 to such an extent so that said spacer elements exhibit an
4 elastic flexible deformability of at least 1% of said
5 nominal diameter in said attachment layer in said
6 microelectronic package.

8. The microelectronic package according to claim 1, wherein said generally ball-shaped spacer elements respectively have a spherical or spheroidal shape.
9. The microelectronic package according to claim 1, wherein said nominal diameter is in a range from 150 μ m to 200 μ m.
10. The microelectronic package according to claim 1, wherein said spacer elements consist essentially of said plastic material, which consists essentially of a single polymer.
11. The microelectronic package according to claim 1, wherein said spacer elements consist essentially of said plastic material, which consists essentially of a mixture or copolymer of at least two different polymers.
12. The microelectronic package according to claim 1, wherein said spacer elements do not contain any silica glass, do not contain any alumina, and do not contain any metal.
13. The microelectronic package according to claim 1, wherein said attachment layer further comprises an anti-static agent applied to said spacer elements or mixed in said adhesive.
14. The microelectronic package according to claim 1, wherein said microelectronic component comprises a sensor.

1 15. The microelectronic package according to claim 1, wherein
2 said adhesive is a silicone adhesive.

3 16. The microelectronic package according to claim 1, wherein
4 said attachment layer is formed from a single drop of said
5 adhesive with said spacer elements dispersed therein, which
6 drop has been applied on said facing surface of said
7 substrate at a location centered relative to said mounting
8 surface of said microelectronic component, and which drop
9 then has been pressed between said facing surface and said
10 mounting surface and thereafter cured to form said
11 attachment layer.

12 17. A method of manufacturing the microelectronic package
13 according to claim 1, comprising the following steps:

14 applying a single drop of said adhesive with said
15 spacer elements dispersed therein onto said facing surface
16 of said substrate;

17 placing said microelectronic component onto said drop
18 with said mounting surface centered on said drop;

19 pressing together said microelectronic component and
20 said substrate with said drop therebetween, so as to
21 flatten said drop into a layer until said spacer elements
22 contact said mounting surface and said facing surface; and
23 then

24 curing said adhesive.

1 18. A microelectronic package comprising:

2 a microelectronic component having a mounting surface;
3 a substrate having a facing surface; and
4 an attachment layer that is interposed between and
5 bonded to said mounting surface of said microelectronic
6 component and said facing surface of said substrate so as
7 to attach said microelectronic component onto said
8 substrate;

9 wherein:

10 said attachment layer comprises a layer of an adhesive
11 and plural generally ball-shaped spacer elements dispersed
12 in said adhesive;
13

14 said spacer elements respectively have a nominal
15 diameter that corresponds to a stand-off distance between
16 said mounting surface of said microelectronic component and
17 said facing surface of said substrate;
18

19 said spacer elements comprise a plastic material that
20 is at least slightly elastically flexible and resilient;
21 and
22

23 said adhesive has a first coefficient of thermal
24 expansion, and said plastic material of said spacer
elements has a second coefficient of thermal expansion that
at least approximately corresponds to said first
coefficient of thermal expansion of said adhesive.

1 19. A microelectronic package comprising:

2 a microelectronic component having a mounting surface;
3 a substrate having a facing surface; and

4 an attachment layer that is interposed between and
5 bonded to said mounting surface of said microelectronic
6 component and said facing surface of said substrate so as
7 to attach said microelectronic component onto said
8 substrate;

9 wherein:

10 said attachment layer comprises a layer of an adhesive
11 and plural generally ball-shaped spacer elements dispersed
12 in said adhesive;

13 said spacer elements respectively have a nominal
14 diameter that corresponds to a stand-off distance between
15 said mounting surface of said microelectronic component and
16 said facing surface of said substrate;

17 said spacer elements comprise a material that is at
18 least slightly elastically flexible and resilient; and

19 said adhesive has a first coefficient of thermal
20 expansion, and said material of said spacer elements has a
21 second coefficient of thermal expansion that is not less
22 than one tenth of said first coefficient of thermal
23 expansion of said adhesive.